

<Adv C & App/>



# Advanced C Programming And It's Application

## Introduction & Syllabus

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*Department of Artificial Intelligence, Tamkang University*

*Sep. 22, 2021*

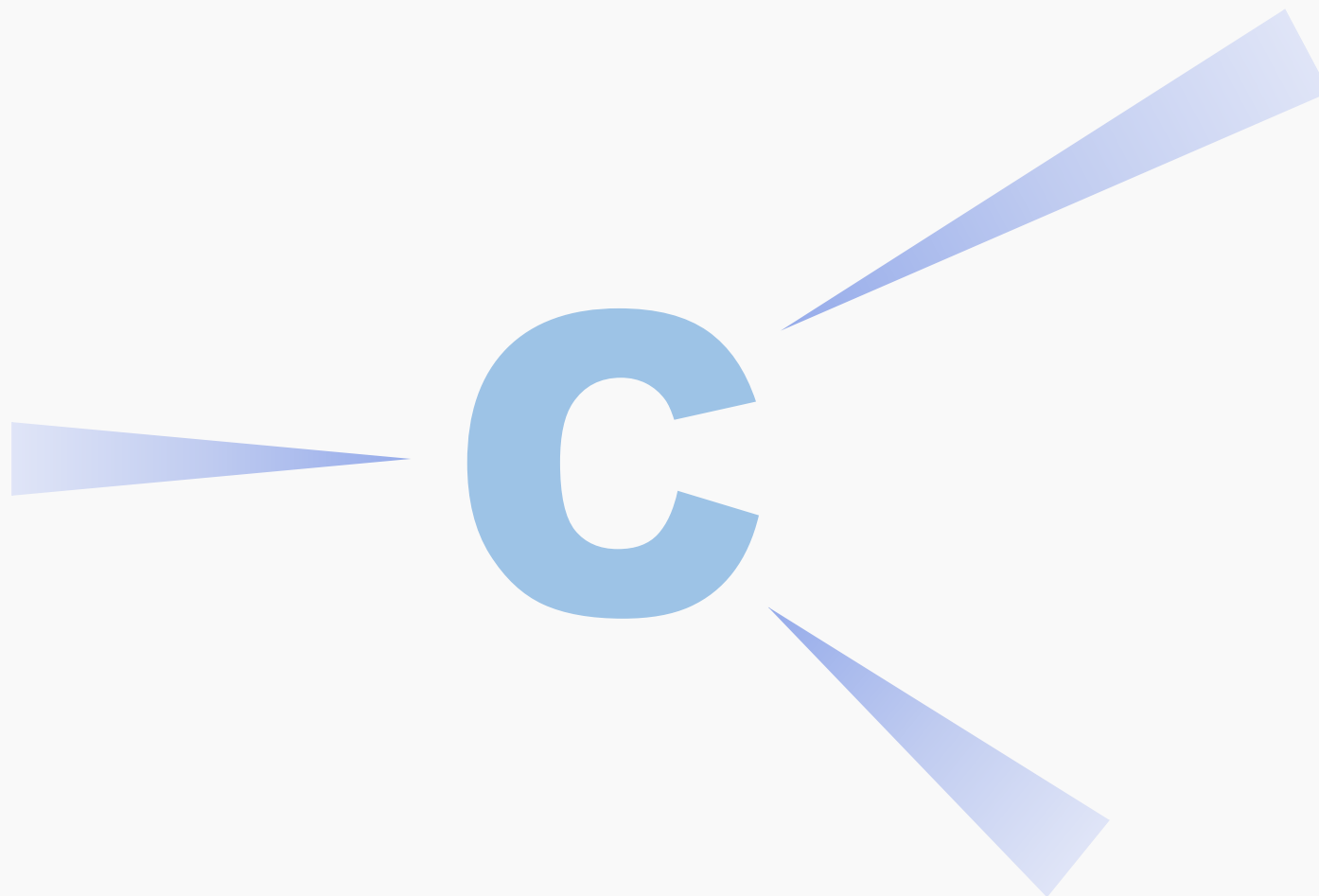
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# 大綱

[1] 簡介

[2] 課程大綱

[3] 課程評量方式



# 簡介



## 目前在職

- 兼任助理教授 | 淡江大學 人工智慧學系
- 博士後研究員 | 臺北醫學大學 醫學系 放射線學科
- 兼任資料科學家 | 中央研究院 社會學研究所

## 主要學歷

- 博士 | 國立臺灣大學 地理環境資源學系
- 碩士 | 國立臺灣大學 地理環境資源學系
- 碩士 | 實踐大學 食品營養與保健生技學系
- 學士 | 國立臺北教育大學 社會與區域發展學系

## 主要經歷

- 資料分析師 | 財團法人資訊工業策進會 資安科技研究所
- 實習生 | 行政法人國家災害防救科技中心 坡地組
- 兼任資料科學家 | 香港中文大學 新聞與傳播學院
- 研究助理 | 臺大地理系 地理計算科學研究室
- 研究助理 | 臺大地理系 遙測及空間知識實驗室
- 研究助理 | 國北社發系 土石流防災實驗室

# 學位論文

## 博士論文

- 國立臺灣大學 | 地理環境資源學系

Characterizing Major Airline Alliances: A Network Analysis

## 碩士論文

- 國立臺灣大學 | 地理環境資源學系

Applying Ultra Low Frequency Remote Sensing Techniques in the Earthquake Precursor Analysis — Using Taiwan as an Example

- 實踐大學 | 食品營養與保健生技學系

Effects of Ultrasonic Treatment on Physical Properties and in vitro Digestibility of High Amylose Maize Starch

## 學士論文

- 國立臺灣大學 | 化學系

Ring-Opening Polymerization of  $\epsilon$ -caprolactone Using Organoaluminum Complexes Bearing Amido-pyridine Bidentate Ligand

- 國立臺北教育大學 | 社會與區域發展學系

Establishing Debris-Flow Cluster and Modified Critical Rainfall Line

## Technical Skills

- **Computer Science:** Python, Matlab, R, C#, JavaScript, jQuery, jQueryUI, Android Development, HTML, MySQL, Nodejs, AngularJS, MongoDB, Elasticsearch, Spark, Facebook APIs and Twitter APIs
- **Geography:** GIS (ArcGIS, QGIS, Super GIS), Spatial Statistics, Spatial Database, Complex Network Analysis, Gephi
- **Physics:** Signal Processing (in time sequence and frequency) and Electromagnetic Analysis
- **Food Chemistry:** Starch Science, Resistant Starch, Slowly Digestible Starch, *in vitro* Digestibility, SEM, XRD and HPSEC
- **Chemistry:** Organometallic synthesis, NMR, IR, HPLC, ESI-MASS and pH meter
- **Design:** Illustrator, Photoshop, Dreamwaver and Google SketchUp
- **Marketing:** Google Analysis, Facebook Marketing and Google Trend

## Interests

Emergency Medicine, Chinese Medicine, Volleyball, Sport Science, Photography, Tourism, Web and Graphic Design

## Languages (4+)

- **Chinese:** Native | **English:** Fluent | **Russian:** Conversant |
- **Spanish:** Beginning | **Japanese:** Beginning

## Certificates (10+)

- 緊急救護技術員證照 (EMT1)
- 掃描式電子顯微鏡使用執照 | X-ray 散射儀使用執照
- 國民小學教師證 | HACCP 品質控管證書 (基礎 & 進階)
- 華語領隊證照 | 華語導遊證照
- TBSA 初級商務企劃師證照
- 國家C級排球裁判 | 救生員證照 | 游泳B級與C級證照

## 研究専長



# 程式語言那麼多 | 如何提升求職競爭力

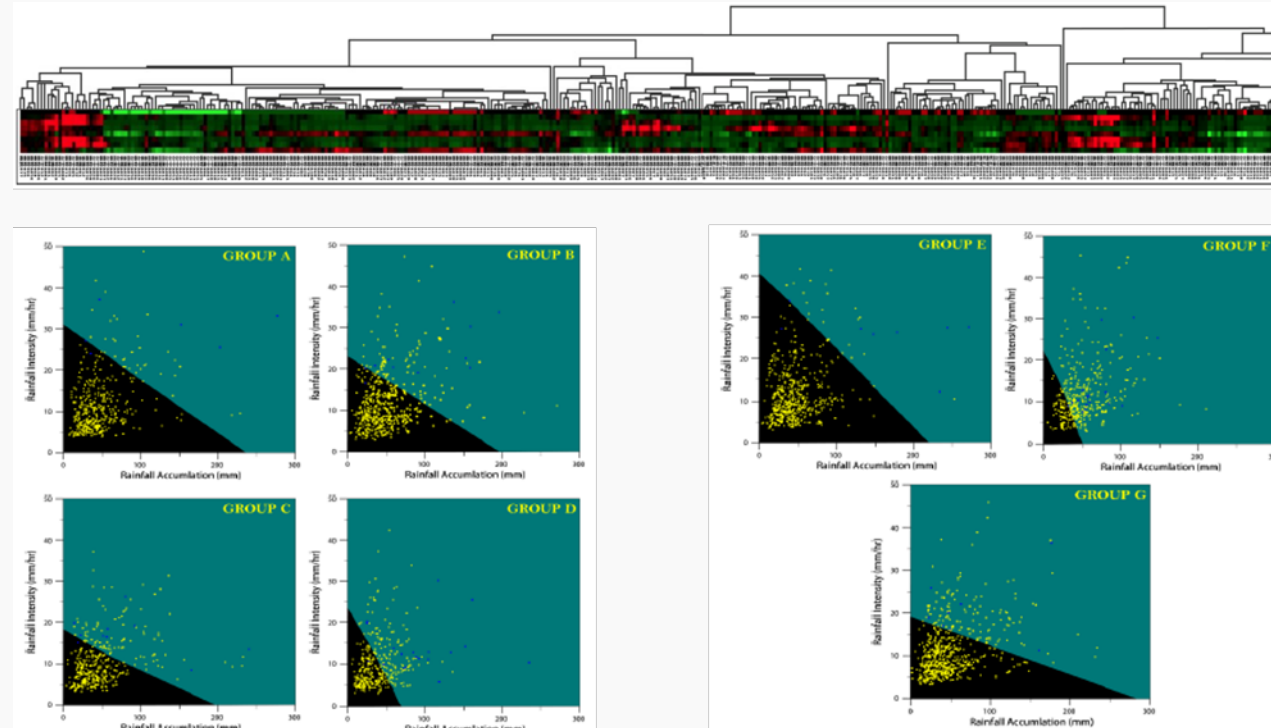
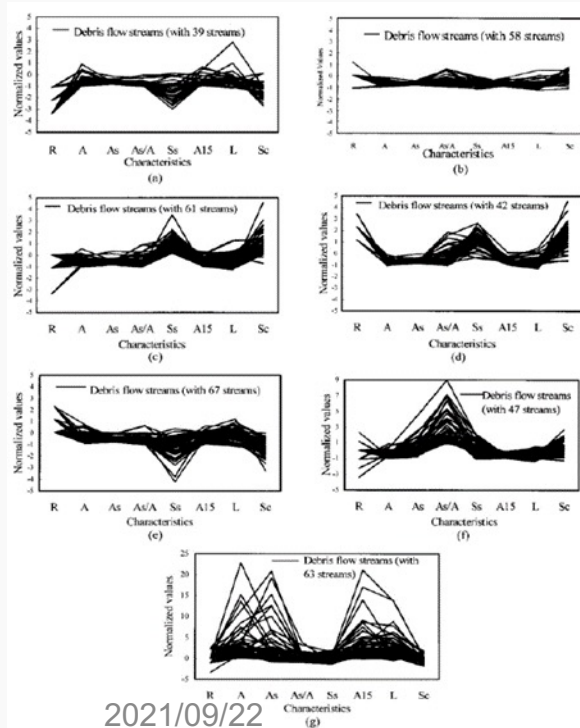
- Q1 程式語言學多不如學精?**
- Q2 到底學哪個程式語言比較好?**
- Q3 學哪個程式語言跟未來工作有關係?**
- Q4 如何在學生時期累積求職競爭力?**
- Q5 這堂課可以帶給我們甚麼新知?**



# Debris Flow Disaster | Part 1 |

Bachelor Thesis | Department of Social and Regional Development | National Taipei University of Education

**Gap/ Objectives:** The Chi-Chi huge earthquake occurred in Taiwan in 1999 and it changed the critical rainfall line of debris flow streams; therefore, how to establish a new critical rainfall line for each debris flow stream with a limited data becomes a vital issue. This study conducted family competition genetic algorithm and support vector machine to establish the critical rainfall line.

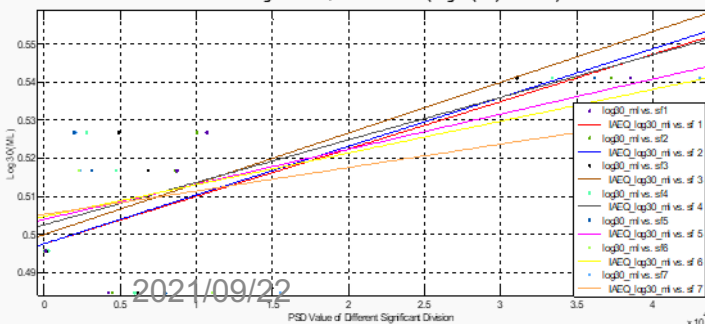
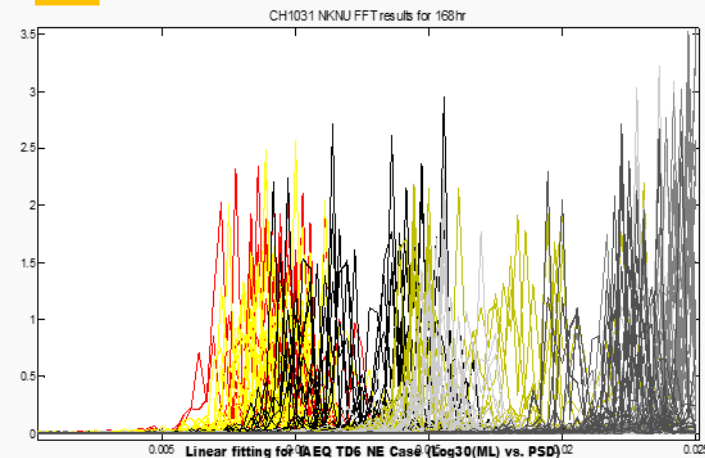


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# Seismic Precursor | Part 2 |

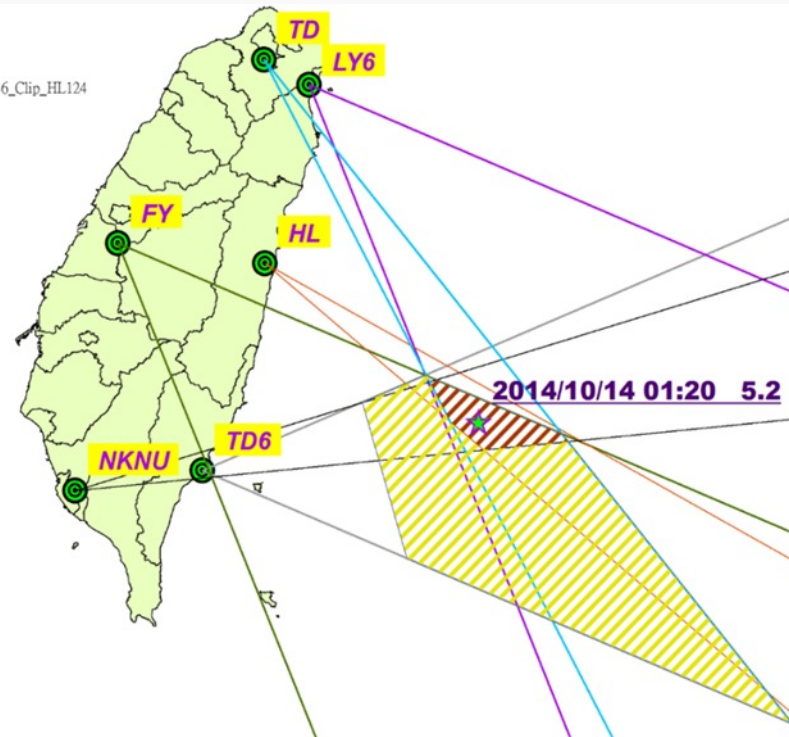
Master Thesis | Department of Geography | National Taiwan University

**Gap/ Objectives :** Taiwan is suffered from earthquake disasters; however, state-of-art only performed case study and empirical equation to depict seismic precursor with a low spatial and temporal accuracy. This study deployed signal processing to capture the feature frequency band, identified the epicenter, estimated break time and magnitude of an earthquake events.

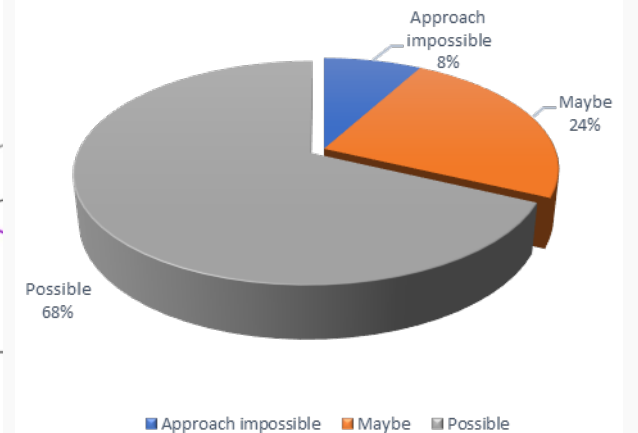


## Legend

- ★ EQ005101452
- ▨ NKTU79FYSE\_LY6SETD146\_Clip\_HL124
- ▨ EQ005101452\_Clip
- TD\_146
- NKTU\_79
- HL\_124
- FY\_SE
- LY6\_SE
- TD6\_E
- TWN\_6station\_97
- TWN\_COUNTY



## Break Time Estimation Possibility

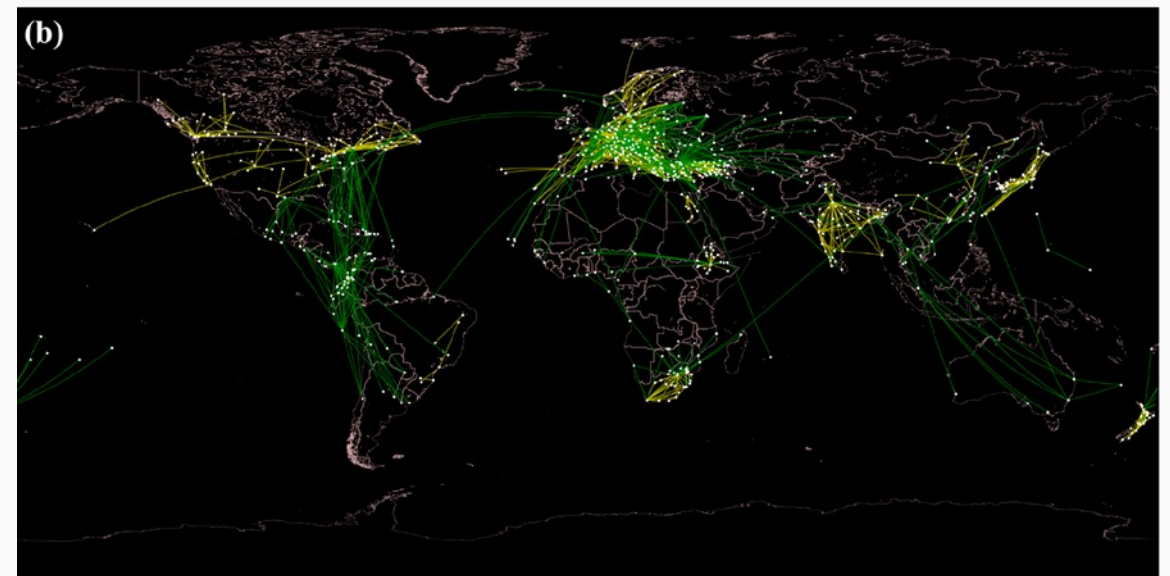
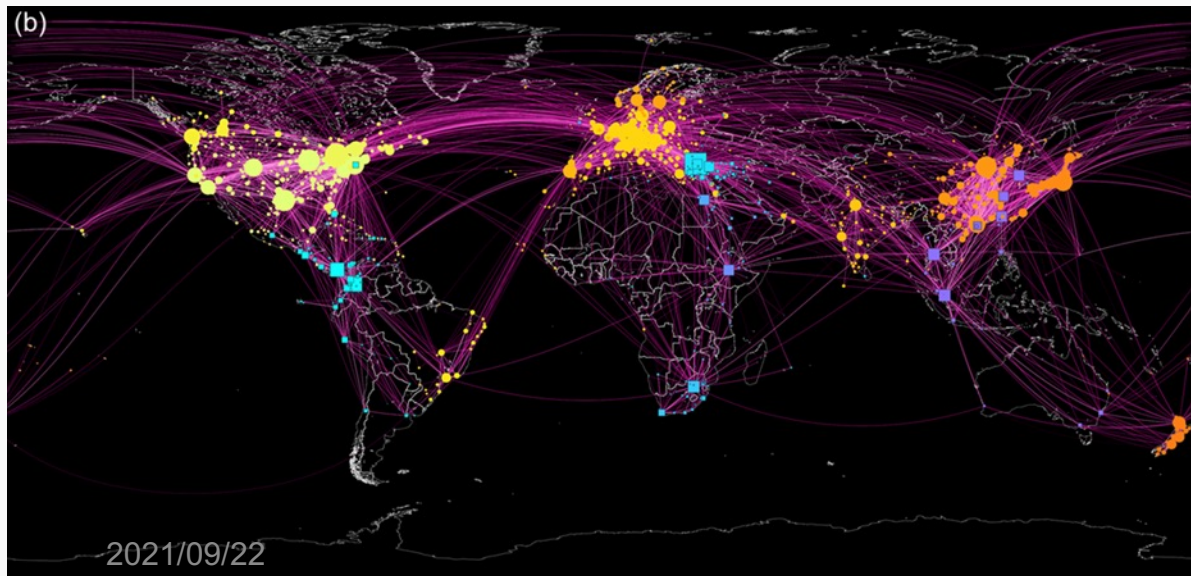


# Aviation Market | Part 3 |



Ph.D. Thesis | Department of Geography | National Taiwan University

**Gap/ Objectives :** Aviation market plays an important role in the accessibility between countries, consisting of airports and routes. However, market-related studies did not consider the connectivity and airport network-related studies neglected the market characteristics. Thus, this study is to utilize the concept of airport community to understand the spatial patterns of the market region in an airline alliance and characterize the differences between airline, including regions of collaboration, competition, and dominance.

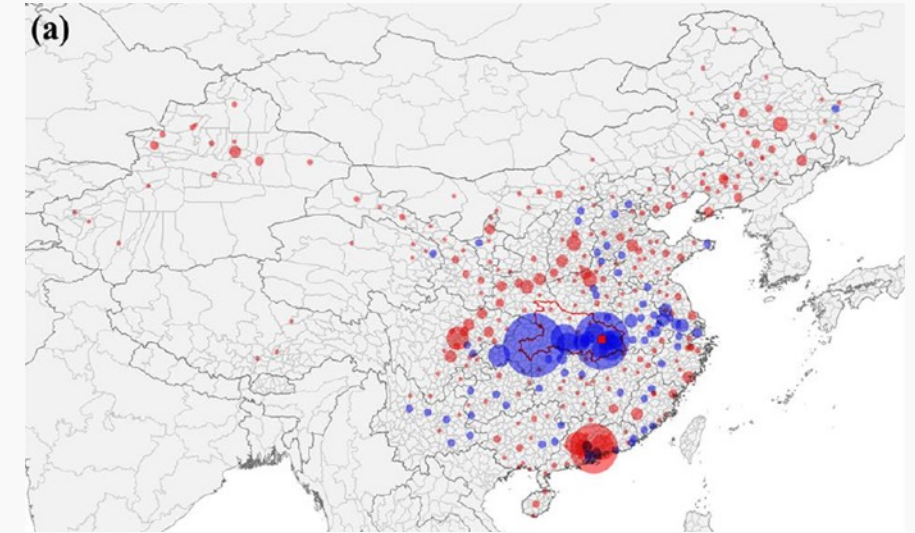
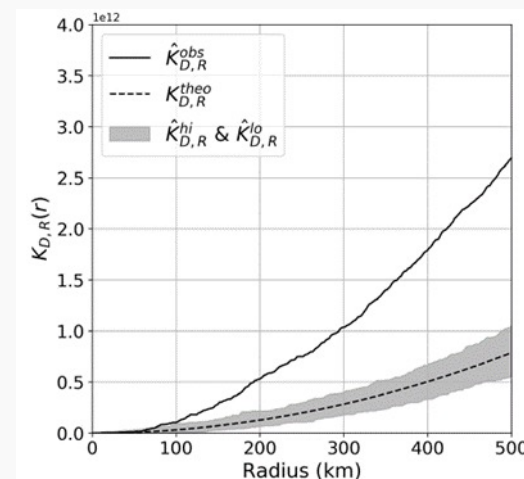
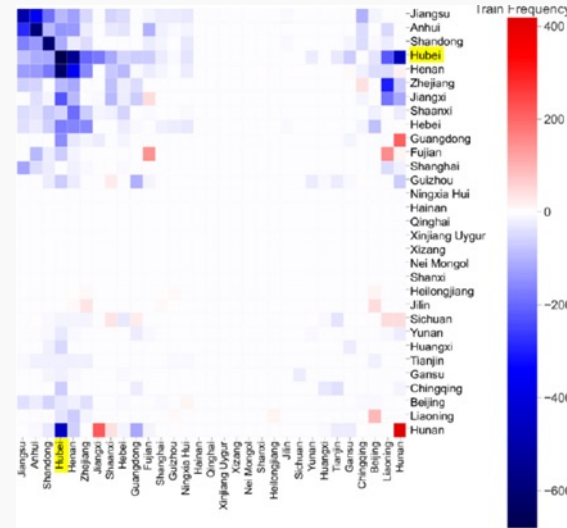




# Epidemic Transmission | Part 4 |

MOST Project | Department of Geography | National Taiwan University

**Gap/ Objectives :** The possible reasons of a large number of confirmed cases concentrated in the neighboring provinces of Hubei have not been fully discussed after the Wuhan city lockdown. Therefore, this study aims to assess the changes in railway passenger transport on the early spatial transmission of COVID-19 in mainland China.



# Starch - *in vitro* digestibility

Part 5

Master Thesis | Department of Food Science, Nutrition, and Nutraceutical Biotechnology | Shih Chien University

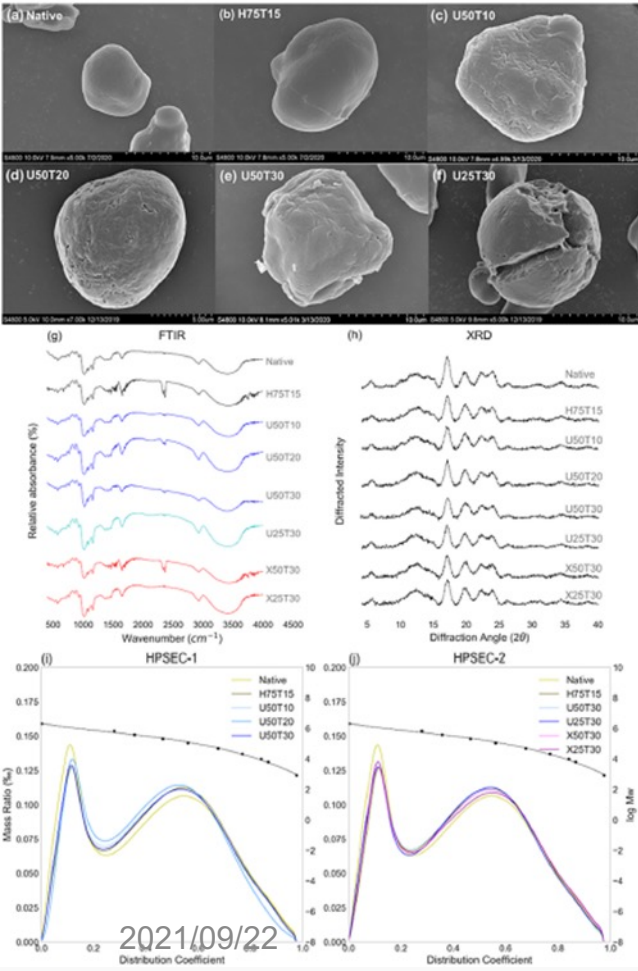


Table 3  
The proportion of variance explained and variable loadings of each principal component.

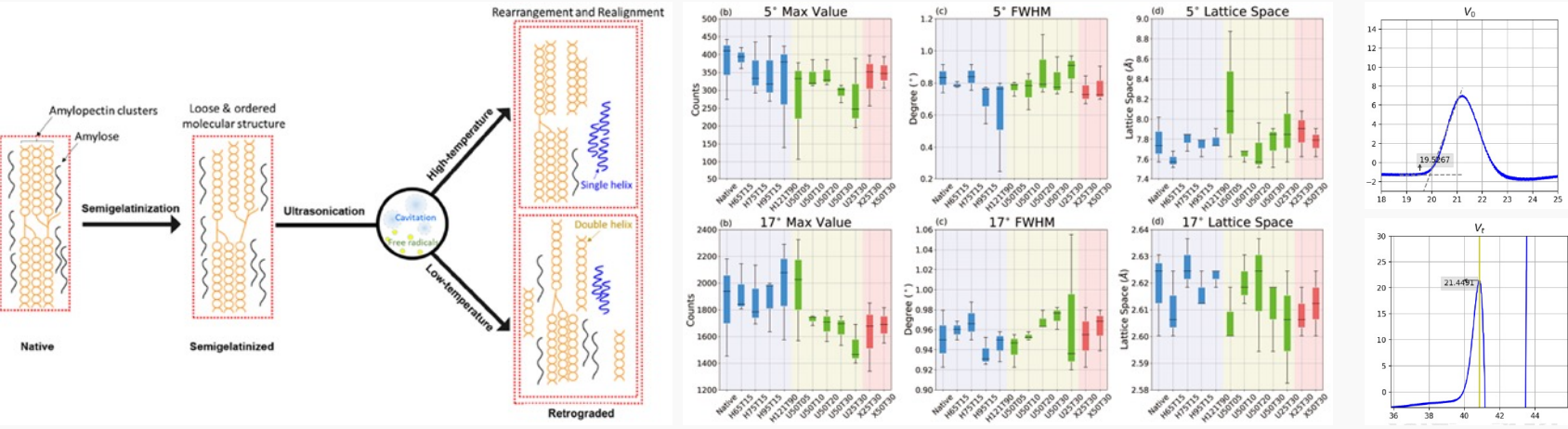
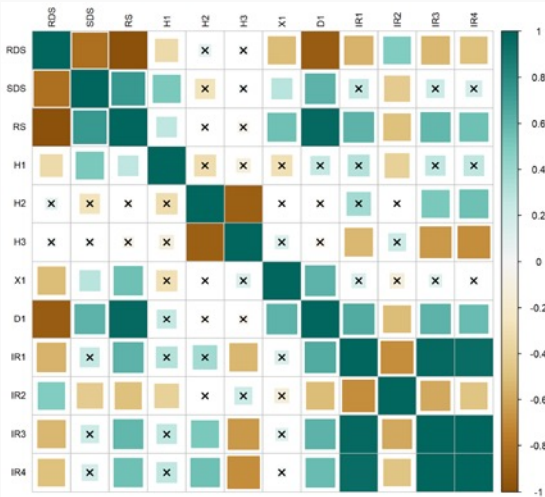
| PC  | PVE  | Variable loadings       |                        |                          |                           |                   |            |       |       |      |       |
|-----|------|-------------------------|------------------------|--------------------------|---------------------------|-------------------|------------|-------|-------|------|-------|
|     |      | FTIR                    |                        |                          |                           |                   | XRD        |       | DSC   |      | AAC   |
|     |      | DO <sub>1047/1022</sub> | DH <sub>996/1022</sub> | AMAP <sub>927/1000</sub> | AMAP <sub>1800/1000</sub> | RC <sub>XRD</sub> | $\Delta H$ | F1    | F2    | F3   |       |
| PC1 | 0.49 | -0.44                   | -0.13                  | -0.44                    | -0.43                     | 0.13              | -0.12      | -0.22 | -0.33 | 0.39 | -0.27 |
| PC2 | 0.25 | 0.00                    | -0.27                  | -0.06                    | -0.10                     | 0.20              | 0.47       | 0.46  | -0.37 | 0.26 | 0.46  |
| PC3 | 0.14 | 0.06                    | -0.12                  | -0.02                    | -0.04                     | -0.75             | -0.48      | 0.25  | -0.25 | 0.19 | 0.16  |

PVE is the proportion of variance explained.

Table 4  
The regression coefficients of each principal component for SDS and RS in multivariate linear regression.

|           | SDS (R <sup>2</sup> = 0.77; adjusted R <sup>2</sup> = 0.71) |            |         |           | RS (R <sup>2</sup> = 0.93; adjusted R <sup>2</sup> = 0.91) |            |         |           |
|-----------|---|------------|---------|-----------|--|------------|---------|-----------|
|           | Beta  | Std. Error | t value | Pr (> t ) | Beta   | Std. Error | t value | Pr (> t ) |
| Intercept | 14.32   | 0.45       | 31.51   | <0.001*** | 42.13  | 0.62       | 51.22   | <0.001*** |
| PC1       | -0.28   | 0.21       | -1.32   | 0.211     | -1.65  | 0.38       | -4.30   | 0.001**   |
| PC2       | 1.34  | 0.29       | 4.56    | <0.001*** | 4.67   | 0.53       | 8.78    | <0.001*** |
| PC3       | -1.62   | 0.40       | -4.07   | 0.002**   | -5.91  | 0.72       | -8.20   | <0.001*** |

Beta is the average coefficient of each independent variable.  
Std. Error is the standard error of each coefficient.  
\*\*\* indicates  $p < 0.001$ ; \*\* indicates  $p < 0.01$ ; \* indicates  $p < 0.05$ .



# 課程大綱

**W1 0922 Introduction**  
**W2 0929 Review: C Variables & Loop**  
**W3 1006 Review: C Condition & Array**  
**W4 1013 Review: C String**  
**W5 1020 Function - Basic**  
**W6 1027 Function - Advance**  
**W7 1103 Pointers**  
**W8 1110 Linked List & Review for Mid-term Exam**  
**W9 1117 Mid-term Exam**  
**W10 1124 Final Project Introduction & Brainstorming**

**W11 1201 Structure**  
**W12 1208 Graphics**  
**W13 1215 Graph\***  
**W14 1222 Tree & Binary Search**  
**W15 1229 Data I/O and Final Project Preparation\***  
**W16 0105 Final Project Presentation**  
**W17 0112 Holiday**

有標註\*為進度報告的週次



# 課程進行方式

課堂練習的部分會希望各位可以在整理成一個檔，下課前我會去尋每一位的程式碼的執行結果作為出席之用。

&lt;Print variables/&gt;

## 不同進位法的表示法

| Character | hex  | octal | decimal |
|-----------|------|-------|---------|
| 0         | \x30 | \x60  | 48      |
| 1         | \x31 | \x61  | 49      |
| 2         | \x32 | \x62  | 50      |
| 3         | \x33 | \x63  | 51      |
| A         | \x41 | \101  | 65      |
| B         | \x42 | \102  | 66      |
| C         | \x43 | \103  | 67      |
| a         | \x61 | \141  | 97      |
| b         | \x62 | \142  | 98      |
| c         | \x63 | \143  | 99      |

Ref: <http://defindit.com/ascii.html>

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### 課堂小練習

Lab:

如何使用hex印出Hello!這六個字元?

&lt;/Print variables&gt;

### 作業

&lt;Assignments/&gt;

#### 作業一

每周都會有一至兩個作業，最好的話是希望各位可以在課堂後練習時間完成，如果遇到比較難或是寫比較久的作業，可以帶回家繼續做。原則上，**deadline**為隔周上課前一天**23:59**上傳至作業區。遲交一天，分數打**8折**，**兩天64折**。

利用巢狀迴圈的方式呈現九九乘法表。

```
1 x 1 = 1  2 x 1 = 2
1 x 2 = 2  2 x 2 = 4
1 x 3 = 3  2 x 3 = 6
1 x 4 = 4  2 x 4 = 8
1 x 5 = 5
1 x 6 = 6
1 x 7 = 7
1 x 8 = 8
1 x 9 = 9
2 x 1 = 2
2 x 2 = 4
2 x 3 = 6
2 x 4 = 8
...
```

進階答案

基本答案

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&lt;/Assignments&gt;

- \* 目前預計上課前一週會將課程投影片上傳。
- \* 期中考的進行方式視課程況狀作彈性調整。

## 期末專題

期中考後作業loading會降低，為了讓大家有充足的時間做期末專題之用或是課堂討論。

人數為3-5人，全班大約分為10組，不過視情況而定。

期末成果發表前會有三次的進度報告：主題發想、初步成果(完整程式架構 + 60%左右的撰寫進度)、完整成果(90%撰寫進度)

期末口頭發表，每組15分鐘，必須包含: code review & live demo!



## 課程評量方式

出席：課堂練習作為出席標準

課堂表現：10 %

作業：30 % (希望可以在課堂內完成!)

期中考：20 % (視情況彈性調整)

專題製作：30 %

- 主題製作完整性：30%
- 難度：30%
- 報告呈現：20%
- 互評成績：20% [小組：50%；組間：50%]

Learning by Doing

Project

Assignment

Mid-term Exam